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WAR FOOD ADMINISTRATION  
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TO: All Veterinary Inspectors

From: P. J. Brandly, Poultry Pathologist  
Inspection and Grading Division

Subject: Answers to Questions on Anatomy and Physiology  
of Poultry

I. Locate and describe briefly and give the function of the following structures:

1. Ulna. The ulna is the long hollow bow-shaped bone of the wing which articulates with the distal end of the humerus and the proximal end of the carpal bones. In fowl it is much larger than the radius which accompanies it. It helps to support the wing and moves as a hinge on both articulations.
2. Coracoid. The coracoid bone is the long hollow bone which lies posterior to the clavicle, between the shoulder joint and the sternum. It is the strongest bone of the shoulder girdle, extending upward, outward, and forward from its firm attachment to the sternum. The superior end articulates with the scapula, where these two bones form the glenoid cavity of the shoulder joint. The superior end also articulates with the clavicle. It supports the sternum and shoulder joint and gives rigidity to the shoulder girdle.
3. Sciatic Foramen. The sciatic foramen, also known as the ishiatic foramen, is the large oval foramen which lies posterior to the acetabulum. It is limited dorsally and anteriorly by the ilium and ventrally and posteriorly by the ischium. It allows the ischiatic nerve and accompanying blood vessels passage to and from the abdominal cavity.
4. Pygostyle. The pygostyle is the term given the skeletal support of the tail and is formed by the fusion of several coccygeal vertebrae.

5. Bursa of Fabricus. The bursa of fabricus, also known as the bursa cloacae or cloacal thymus, is located above the cloaca. Ducts from the bursa open on the dorsal surface of the posterior cavity of the cloaca. It is found only in young birds and reaches a maximum size in four to five months, at which time it may reach a size of  $\frac{1}{2}$ "x1" and has nearly disappeared by ten months. The wall has a serous and muscular tunic, the mucosa is much folded and contains many lymph follicles. The function is not known.
6. Thymus. The thymus gland is composed of many lobules and may extend throughout the cervical region. It shows greatest development in young birds and atrophies but never disappears in old birds. It is composed largely of lymphoid tissue but its true function has not been determined.
7. Thyroid and Parathyroid. The thyroid consists of two small elliptical lobules, lying intra-thoracically on large vessels arising directly from the heart. The parathyroid consists of two very small lobules, the smallest one located behind the largest, which is posterior to the thyroid. Both of these are endocrine or ductless glands. The thyroid aids in metabolic control and the parathyroid governs calcium metabolism.
8. Remnant of Yolk Stalk. The remnant of yolk stalk is a pointed process appearing about the middle of the mesenteric portion of the small intestine, opposite the mesenteric attachment. It is more prominent in young birds but never completely disappears. It has no function and is merely an embryonic relic.
9. Air Sacs. The air sacs connect with primary and secondary bronchi and have a thin inner mucosa continuous with that of bronchi and an outer serous layer of pleura or peritoneum. There are two thoraco-cervical sacs located at cervico-thoracic junction. Prolongations extend forward through each canalis transversarius as far as the third cervical vertebra, and backward as far as the fourth thoracic vertebra. They have air connections with the vertebra and with each other.

The anterior thoracic air sac, as the name indicates, is in the anterior part of the thoracic cavity. It has a right and left diverticulum projecting into intermuscular spaces of the shoulder.

The posterior thoracic air sacs are paired and are bounded by the pulmonary and thoraco-abdominal diaphragms. These sacs have no air connections with bones.

Lesser abdominal air sacs are paired. These laterally compressed spheroids are located on the anterior part of the abdominal wall at about its middle third. This pair has no air connection with bones.

Greater abdominal air sacs are paired, the left is much larger than the right. These sacs lie on each side of medially located viscera and have air connections with the sacrum, hip bones and femur. Pneumatization of the femur is disputed by some investigators.

10. Hollow Bones. Bones of legs, wings, sternum, and vertebrae are hollow. Cavities are more pronounced in hollow bones of birds of flight.

II. Explain the difference in the lymphatic system of mammals and birds?

Mammals have lymphatic nodes throughout the body through which the lymph is filtered before it returns to the blood vessel circulation. The lymph vessels which carry the tissue fluids expressed from the cells during metabolism are similar in character in both mammals and birds. True lymph nodes are lacking in birds and the lymphoid tissue, though widely dispersed, is found chiefly in the wall of the digestive tube, the thymic nodules and the Bursa of Fabricius. As a result of this absence of true lymph nodes and the consequent lack of filtration of the lymph, infectious diseases in the bird tend to become disseminated in the organs, while in the mammals the infections usually localize first in the lymph nodes and may either remain localized or later may become generalized. Tuberculosis is a good example of this difference in birds and mammals.

III. Give a description of the urinary system and explain the difference between that of fowls and mammals.

The urinary systems of mammals consists of kidneys, ureters, bladder and urethra. The kidneys of birds are essentially the same as those of mammals, although the arrangement of the kidney into cortex and medulla is not so distinct. The urodaeum of the cloaca serves as the bladder into which the ureters empty. The urinary compounds in the urine, when excreted from the ureters, soon precipitate largely in the form of urates. In all cases, except in starvation, where precipitated urates are present in the ureters or collecting tubules of the kidney, some pathological process is present in the bird.



